

## APPENDIX F

### USES OF MISSION-ORIENTED PROTECTIVE POSTURE

In MOPP gear, soldiers have protection against all known chemical agents, live biological agents, and toxins. MOPP gear does not protect against initial nuclear radiation or the hazards of residual radiological contamination from induced gamma and fallout. However, it gives some radiation protection because of complete body coverage. It reduces the chance of beta particles coming in contact with and burning the skin, and it reduces the possibility of wearers ingesting alpha particles. This encapsulation also helps simplify decontamination, but this protection demands a price be paid. Soldiers wearing MOPP gear cannot work long or fast. They may suffer mental distress as a result of feeling closed in and will suffer from heat stress and heat exhaustion in warm temperatures and at high work rates. Thus, when the NBC threat is low, full protection may not always be worth the resultant reduction of combat potential.

The need to balance protection with the threat, temperature, and urgency of the mission led to the concept of MOPP. Commanders can raise or lower the amount of protection through five levels of MOPP—MOPP zero through MOPP4. In addition, commanders have a mask-only option. Protection increases with progression from MOPP zero to MOPP4, but efficiency decreases correspondingly; therefore, selecting the MOPP level that provides the best balance requires judgment. (For additional information, see FM 3-4.)

#### F-1. MOPP LEVELS

Standardized MOPP levels allow commanders to easily increase or decrease levels of protection. Because the levels are standardized and all soldiers understand them, commanders can order increased or decreased protection without providing long explanations. Soldiers put on first the elements of MOPP gear that take the longest to put on and that degrade mission performance the least. They put on last the MOPP gear elements that can be put on quickly and degrade mission performance the most. This flexibility gives soldiers a head start at putting on MOPP gear.

a. **MOPP Zero.** Soldiers carry the protective mask with LCE, having the MOPP gear readily available (that is, within the work area, vehicle, fighting position, or the like). MOPP zero is appropriate when the enemy has an NBC employment capability but chemical warfare has not begun or when troops are first deployed outside the theater of operation. MOPP zero allows

soldiers to be free of the burden of wearing the overgarment and mask, and yet have them readily available when needed. The battle dress overgarment should remain sealed in the vapor-barrier bag until needed. Soldiers carry their M258A1 decontamination kit, M8/M9 detector paper, and NAAK.

b. **MOPP1.** Soldiers in MOPP1 wear the battle dress overgarment. In hot weather, they can wear it directly over their underwear and may leave the jacket open for ventilation, but they must keep the trousers closed. They attach the M9 paper to the overgarment and wear the protective helmet cover. For soldiers in MOPP1, the reaction time needed to adopt MOPP4 protection against an attack is half, from 8 minutes to 4.

c. **MOPP2.** Soldiers in MOPP2 add their chemical-protective overboots. The overboots take about three to four minutes to put on; once troops are in MOPP2, they can go to the higher MOPP levels in seconds. In hot weather, soldiers can leave

the overgarment jacket open for ventilation but must keep the trousers closed.

d. **MOPP3.** Soldiers wear the protective mask and hood in MOPP3, making protection almost complete, but interference with work becomes significant. The mask and hood restrict vision, heat stress becomes a major factor, and a greater risk of heat exhaustion exists. In hot weather, soldiers may open the overgarment jacket and roll the protective-mask hood for ventilation but must leave their trousers closed.

e. **MOPP4.** Soldiers in MOPP4 protect their hands with a pair of NBC rubber gloves with cotton liners. They close the overgarment and pull down and adjust the hood, completing protection. MOPP4 has the most negative impact on individual efficiency and effectiveness.

## F-2. MASK-ONLY POSTURE

**WARNING**  
DO NOT USE MASK-ONLY POSTURE WHEN  
A BLISTER AGENT IS PRESENT.

In a contaminated environment, soldiers do not need to wear protective overgarments or rubber gloves as long as they are protected from direct skin exposure to liquid or solid contamination (transfer hazards). Tanks, some vans, and some buildings are examples of this kind of partial shelter from contamination. Inside these shelters, soldiers may be exposed to vapor hazards but not to transfer hazards. A teletype operator inside a sealed communications van, for example, can work safely and far more efficiently in mask-only posture.

a. Commanders must balance the value of increased efficiency that mask-only posture gives against the increased risk it imposes. If the shelter is penetrated by weapons fire or accident, soldiers inside might be exposed to a transfer hazard. In case of shelter penetration, ordinary clothing provides brief protection from transfer hazards.

b. Soldiers in mask-only posture must assume the appropriate MOPP level before exiting their shelter. To maintain mask-only posture, returning soldiers must carefully avoid bringing liquid contamination into the shelter. The following situations are appropriate for the mask-only command:

- Troops outside are at MOPP3 or MOPP4, and a chemical attack has not occurred.
- Troops outside are at MOPP4, and the unit is in a downwind vapor-hazard area only.
- An attack has occurred, and the only hazard has been determined to be nonpersistent vapor.

Ultimately, the decision rests with the commander to go to mask-only for personnel protected from liquid-agent contact. Mask-only is not an appropriate command when blister-agent hazards exist.

## F-3. SYSTEM FLEXIBILITY

MOPP is not a fixed or rigid system. Flexibility is the key to providing maximum protection with the lowest risk possible while still allowing mission accomplishment. Flexibility allows subordinate commanders to adjust the amount of MOPP protection required in their particular situations and still maintain combat effectiveness. Also, commanders can place all or part of their units in different MOPP levels or can authorize variations within a given level.

a. **Responsibility for MOPP Levels.** It is corps and higher level commanders' responsibility to direct minimum MOPP levels and recommend the higher MOPP levels appropriate to the threat. They are aware of the strategic tactical intelligence that might indicate the probable use of NBC weapons. These commanders have the first responsibility for upgrading the unit's protective posture. Ordering MOPP2 through MOPP4 is the responsibility of division and lower commanders. The ultimate responsibility, however, is that of the company commander, platoon leader, or squad leader. At this level there is a better understanding of what the unit can and cannot do. The leader increases or decreases the unit's protective posture based on an analysis of the situation and guidance from higher command. Final responsibility at this level retains flexibility of the system. The leader does not decrease the protective posture level below the minimum established level.

b. **Variations to MOPP Levels.** Considerable flexibility within each MOPP level allows variations based on the situation. Certain variations of

the wearing of MOPP gear reduce degradation of unit efficiency. Commanders must weigh these variations against the possible risk of contamination and mission accomplishment. Commanders should make these decisions on the spot to modify MOPP. The following gives some suggested variations.

(1) Soldiers may leave the overgarment jacket open at MOPP1, MOPP2, or MOPP3, allowing greater ventilation, and they may leave the hood open or rolled at MOPP3. Commanders base their decision to use this variation on the threat, temperature, and unit work rate.

(2) Wearers may don the overgarment over the battle dress uniform (BDU) or directly over underwear. Determining factors are the temperature and the work rate of personnel.

(3) Soldiers must wear the protective gloves at MOPP1 through MOPP3 when handling equipment that has been decontaminated. This prevents contact with agents that may absorb to the surface of the equipment.

(4) Where the only hazard is from residual nuclear effects, the commander may modify MOPP levels based on assessment of the situation and criticality of the mission. As stated earlier, MOPP gear does not protect against gamma radiation, which is the commander's immediate concern. Once it has been determined that only a low-level residual radiological hazard exists, the commander may decide to modify the unit's posture, because of mission requirements. This reduces the degradation of unit performance caused by heat stress.

(5) Risks include burns from beta particles and ingestion of alpha particles. Another is the greater problem of removing radiological particles from the hairy areas of the body, since showers are no longer part of the decontamination process. As a last resort, soldiers may use the wet wipes of the M258A1 kit for this purpose. Neither situation will cause excessive degradation of unit performance, but both must be considered.

(6) One method of modifying the protective posture allows soldiers to wear the cloth liners from their butyl gloves. This helps cover as much exposed skin as possible. Soldiers can cover their mouths with handkerchiefs or other material that provides dust protection in place of their protective masks. The primary concerns are to reduce the

amount of radioactive contamination that contacts the skin and to prevent ingestion of radioactive particles. If soldiers can accomplish the mission while in full MOPP gear, they will reduce beta burns and alpha particle ingestion hazards and avoid additional decontamination procedures.

#### F-4. MOPP ANALYSIS

Every commander has a responsibility to go through a MOPP analysis based on the situation. The analysis finds the balance between reducing the risk of casualties and accomplishing the mission. The use of MOPP involves risk, but the better the commander analyzes the complex factors that control the need for protection, the lower the risk and the higher the mission performance. Before deciding, the commander must consider the following questions in the analysis:

- What is the mission?
- What is the work rate?
- How much time will the work require?
- Is the unit targeted?
- What is the warning time?
- What is the weather?
- What additional protection is available?
- What are the training and physical levels?
- Is it day or night?

a. **Mission.** What type of mission has the unit been given? The mission greatly influences the amount of protection needed by each soldier. How important is the mission, and what risks will it require?

b. **Work Rate.** What work rate will the mission require? Physical work rate is categorized as light, moderate, or heavy. Clerical and administrative tasks and riding in vehicles are examples of light work. Handling supplies and equipment, and preparing defensive positions are examples of moderate work. Fighting or forced marching are examples of heavy work. Soldiers doing heavy work tire more quickly than those doing lighter work. MOPP gear reduces soldiers' effectiveness at all work rates, but the reduction becomes more severe as the work rate increases.

c. **Required Time.** How much time will it take to accomplish the mission at different levels of

MOPP? The commander can estimate the time needed to accomplish the mission. To give the commander an idea of how much time tasks will take in MOPP4, Appendix A, FM 3-4, shows tables for various types of units. Remember, the tables are only a guide, and only experience can give accurate times. Increases in the time needed to conduct operations in MOPP3 are somewhat less than in MOPP4. This is because some body heat dissipates through the open hood and overgarment in MOPP3. However, soldiers cannot achieve normal work times until they remove their masks and hoods. The hood and shoulder areas release most of the body heat. If retained, this heat increases the time required to do a job. With only one exception, there are no major time increases for units operating in MOPP1 and MOPP2. The exception is extensive travel on foot in MOPP2, because overboots slow travel.

d. **Target.** How likely is it that the unit will be attacked with NBC weapons? The answer is a judgment based on knowledge of the way NBC weapons are used. First, there is the matter of the unit location on the battlefield. Is the unit close to the front lines? Mortars and artillery can deliver chemicals accurately, and the closer the unit is to enemy observers, the more accurate and timely enemy fire is likely to be. Is the unit considered a primary target in the rear area? Persistent agents are more likely to be used in the rear to disrupt operations that support the front lines. If the unit is on a likely avenue of approach, use of nonpersistent agents is likely.

e. **Warning Time.** How much warning of an enemy NBC strike can be anticipated? The commander must consider available intelligence. Has the enemy used NBC weapons? Has the enemy deployed weapon systems and munitions? Do wind direction and speed place the unit in a downwind-hazard area? If so, he must consider placement of the unit alarms. What are the lay of the land and the wind direction? Are the alarms positioned in locations that will give best early warning? Have adjacent units experienced any unexplained illness?

f. **Weather.** What are the weather conditions, and how will they influence the unit's performance? High temperatures and humidity make it difficult for the body to dissipate heat, and this is

compounded when soldiers must wear MOPP gear, which retains even more heat. The more body heat retained, the fewer hours soldiers can work without increasing their chance of heat exhaustion or heat stroke. This, coupled with the work rate, requires units to take more frequent and longer breaks, thus taking longer to accomplish the mission. Wind speed may also be a factor to consider. High wind speeds aid in the dissipation of body heat as well as decrease the probability that the enemy will employ chemical agents.

g. **Additional Protection.** What additional protection is available? Any form of available overhead cover provides additional protection. Depending on the wind speed and type of cover, the commander can reduce MOPP levels, using sound judgment. The possibility of a percutaneous (through-the-skin) hazard still exists, and soldiers should wear as much protection as mission and resupply capabilities allow.

h. **Troop Preparedness.** How well are the troops trained, and what is their physical condition? Well-prepared troops suffer less stress when in MOPP4 under combat conditions than do troops who are less prepared. Well-prepared troops are those who have trained extensively in protective gear and are in good physical condition. It cannot be overemphasized that soldiers must train with their MOPP gear, including many hours of training in MOPP4. Soldiers cannot be expected to fight successfully in full MOPP gear if they have not trained with the equipment. Infantrymen train extensively with the M16 rifle to become proficient with its use. Likewise, soldiers must continually train with MOPP gear to become more confident of the equipment and learn how to adjust their way of working. Training in full MOPP gear helps soldiers understand the problems they will encounter when required to fight in MOPP gear.

i. **Time of Day.** Is it day or night? The best time to use chemical agents is between late evening and early morning, when stable or neutral temperature gradients prevail. Under these conditions, agents tend to linger close to the ground and move horizontally with the wind. During unstable conditions in the heat of the day, agents rise rapidly. This rapid rise reduces the time on target and the agents' casualty-producing capabilities.

j. **Commanders Decision.** After answering these questions, the commander can decide on the amount of protection needed to accomplish the mission, continuously updating and refining the process as the situation changes. The following scenario is an example of applying a flexible MOPP system.

“Intelligence reports indicate Threat forces are advancing on the corps area. Reports are that large shipments of chemical munitions have been moved forward to artillery units in support of the Threat first echelon. The corps commander has directed MOPP1 for all units in the corps area of operations. Division and brigade commanders determined that the threat does not involve all units within their areas of responsibility. They recommend that all units assume MOPP2.

“An infantry company commander, using the MOPP analysis and his commander’s guidance, determines that his unit is a primary target and must complete defensive preparation before the Threat forces arrive in an hour. The unit alarms are in position and will provide early warning of a chemical attack. The commander determines that he must modify the unit protective posture and prepare for an attack. Half the unit assumes MOPP2 and continues defensive preparation. The remainder assumes MOPP3 and provides security. If an attack occurs, soldiers in MOPP2 will take only seconds to assume a higher MOPP level. Thus, the commander applies the flexible MOPP system and accomplishes the mission in the required time with the least amount of risk.”

## F-5. OTHER PROBLEMS

Several other problems arise when troops encounter NBC weapons. Although these problems are not as important as the questions already discussed, the commander must consider them.

a. **Command, Control, and Communications.** In an NBC environment, command, control, and communications are difficult. Performance of command functions while in MOPP gear presents problems all commanders must consider. A few of these problems are the following.

- Heat stress causes personnel in responsible positions to tire easily.
- The voicemitter makes speech difficult to understand.
- The M17-series mask impairs voice communication in both volume and quality on radio and field phones.
- The hood impairs hearing.
- Eye lenses of the mask narrow the field of vision.

To minimize some of these difficulties, leaders can delegate more responsibilities to reduce the stress of wearing MOPP gear. The unit SOP must include specific guidelines based on the mission. When using the radio, leaders must ensure the microphone is held close to the voicemitter. If possible, they wear the microphone-equipped M24/M25 mask and use the vehicular communication system. To enhance verbal communications, they speak more slowly than normal and repeat orders. If time permits, leaders issue written orders to ensure orders are understood. They use collective protection as much as possible to eliminate the burden of MOPP gear.

b. **Personal Identification.** One way to help identify each soldier in MOPP gear is to use tape showing the soldier’s name and rank. The soldier wears this tape on his protective-mask carrier and overgarment pocket. If he is in MOPP zero, the tape is placed on the overgarment bag. When the overgarment is put on, the soldier pulls the tape off the package and places it on his overgarment for identification.

c. **Miosis.** Small amounts of nerve agent absorbed through the eyes constrict the pupils. This condition is called *miosis*. It may involve pain, headaches, or both. The pupil is unable to dilate normally, thus reducing night vision and the efficiency of operating night vision devices. Miosis can reduce the efficiency of performance of other tasks at night, such as navigating on foot, identifying and engaging targets, driving vehicles under blackout conditions, and flying, which requires pilots to change focus frequently. Miosis ranges from minimal to severe, depending on the nerve agent dosage. Victims may experience headaches when they are exposed to bright light. Severe miosis and

the reduced ability to see in dim light can persist for 48 hours after onset. The pupil gradually returns to normal after several days. Full recovery may take more than 20 days. Repeated exposures within this period cause cumulative effects. Commanders must identify personnel performing critical tasks dependent on night vision and initiate precautions to minimize miosis:

(1) Have key personnel mask whenever there is risk of encountering miosis-producing hazards.

(2) Have them mask when close to ground, equipment, or other personnel known to have been contaminated with liquid nerve agent.

(3) After detailed decontamination (FM 3-5), personnel should move away from their equipment. Have them move to a contamination-free area and conduct short unmasking periods. They should disperse in the open air and use the buddy system to observe for possible miosis symptoms.

(4) Use collective protection as much as possible.

**d. Psychological Effects.** Commanders must always be aware of the psychological effects soldiers encounter while wearing protective clothing.

(1) History shows that 10 percent of battlefield casualties are caused by psychological factors. In an NBC environment, 25 percent of casualties may be psychological in origin. Symptoms may include claustrophobia, apprehension, paranoia, disorientation, distorted body sensations, hallucinations, confusion, and panic.

(2) Many of these symptoms can be prevented by continually reinforcing NBC training and by educating soldiers on NBC survival measures. During peacetime, soldiers should receive extensive concurrent training in full MOPP gear. This allows soldiers to become more confident in the equipment. It also increases the time that MOPP gear can be worn without serious effects.

**e. Food Contamination.** A soldier's ability to eat in an NBC environment depends on the type and extent of contamination. In a contaminated area where there is also a vapor hazard, leaders should move troops into a collective-protection facility. Since collective-protection shelters have a limited capacity, small groups should be rotated through these facilities.

(1) In a contaminated area with no collective protection available, leaders can relocate troops to a safe area for feeding by rotating small portions of the unit or by entire unit replacement. The rotational method selected depends largely on the situation, distance from the safe area, and availability of uncontaminated areas.

(2) If the troops are in a contaminated area with no detectable vapor hazard or in a clean area where they are under constant threat of NBC attack, leaders can use a rotating basis for feeding about 25 percent at any one time. They must take care to prevent contaminating the food.

**f. Water Supply.** The human body depends on water to cool itself in a hot environment. Soldiers in MOPP4 may lose more than one quart of water each hour. They must replace these losses continually.

(1) Leaders should base an approximate recommended replenishment on work rate and temperature. For example, with a moderate to heavy work rate and temperatures below 80 degrees F (27 degrees C), water consumption should be one quart for each person every three hours. With the same work rate but temperatures above 80 degrees F (27 degrees C), the water consumption should increase to one quart every two hours. Otherwise, soldiers can suffer rapid rise in body heat and heart beat, decrease in ability and motivation to work, and, eventually, heat exhaustion.

(2) Troops equipped with M17A1/M17A2 protective masks should be able to drink from their canteens while masked. If the drinking tube is not working or if masks do not have drinking tubes, soldiers should use the buddy system and follow the procedure detailed under food and water consumption in FM 3-4, Chapter 5.

(3) Leaders should arrange for additional water supply by having filled canteens delivered in exchange for empty ones. If water and additional canteens are in short supply, they should observe water economy measures. Such measures include reducing physical activity or limiting it to the early morning, evening, and night hours when the heat load and sweat loss are lessened. The reduction of water intake to economize in turn reduces work capability and efficiency, and increases the risk of heat injury.